Fire Protection Systems Design Documents

Q: What are the requirements for whether a PE or NICET level designer submits fire protection plans?

A: This is not as easy to answer as it sounds.

According to the International Fire Service Training Association (IFSTA) out of Oklahoma State University, home to one of the top fire protection engineering schools in the country,

> To design a sprinkler system the designer must know the architectural features and layout of the building's subsystems. For that reason, the sprinkler system drawings are usually prepared by the sprinkler contractor working from the finalized architectural plans, although the conceptual design drawings may be drawn by the architect or project mechanical engineer.[1]

Fire alarm systems are similar but different. They can be a basic occupant notification system or a sophisticated and complex system that integrates with many of the building's systems and services requiring hundreds of devices.

The issue of who designs fire protection systems and prepares the drawings has been a controversial subject for many years. To address that controversy the Arizona Board of Technical Registration (BTR) issued a substantive policy statement effective March 18, 2002, that states who does what.

In their statement the BTR requires that a professional registrant perform the following activities (emphasis added):

1. A qualified registrant, or any other person, **may develop** *installation drawings for fire sprinkler, fire alarm*, and other regulated code alarm systems and submit those drawings to the authority having jurisdiction for review and/or permit as allowed by the authority having jurisdiction.

   All layouts prepared in accordance with the criteria specified by a professional registrant *are not* considered to be professional documents.

[1] International Fire Service Training Association, Plans Examiner for Fire and Emergency Services, 1st Edition, 2005, Oklahoma State University (Pg 225)

2. For **fire sprinkler systems**, the following are considered to be professional registrant activities:
    1. Consider the range of hazards of the project;
    2. Prepare hazard analysis; identify the hazard classification of the intended occupancy, including any special hazards;
    3. Determine the applicable codes and standards and appropriate engineering practices;
    4. Ascertain the availability and adequacy of the water supply for the project.

3. For fire alarm and other code regulated alarm systems, the following are considered to be professional registrant activities:
    1. Determine the system type;
    2. Determine the applicable codes and standards and appropriate engineering practices;
    3. Determine device types and locations;
    4. Prepare generalized riser diagram;
    5. Coordinate and interface with other systems;
    6. Develop system specifications.

    Examples of **work that may be done by a non-registrant** are:

    The layout of automatic fire sprinkler systems and their related hydraulic calculations for installation or a permit.

        Installation drawings for sprinkler systems may include selecting pipe sizes by performing hydraulic calculations in accordance with applicable codes and standards.

    Preparation of fire alarm installation drawings,

        This includes circuiting and voltage drop and battery calculations, in accordance with applicable codes and standards **may be done by non-registrants as allowed by the authority having jurisdiction.**

The National Fire Protection Association (NFPA), the world's leading authority on fire prevention and public safety, establishes the standards for an array of fire safety issues.

NFPA 13 Standard for the Installation of Sprinkler Systems 2007 Edition is silent on the issue of qualifications of system designers and installers, but does address the issue of preliminary (conceptual) plans and working (shop) plans.

A.22.1 Preliminary plans should be submitted for review to the authority having jurisdiction prior to the development of working plans *[see Figure A.22.1(a)]*. The preliminary plans can be part of the construction documents submitted in order to obtain a building permit. However, working drawings in accordance with Section 22.1 should be submitted and approved prior to the installation of system equipment. Preliminary plans should include as much information as is required to provide a clear representation of the hazard to be protected, the system design concept, the proposed water supply configuration, and building construction information pertinent to system layout and detailing.

NFPA 72, the National Fire Alarm Code® 2007 Edition does address the issue of qualifications of fire alarm designers and installers.

NFPA 72 - National Fire Alarm Code® 2007 Edition

4.3.2 System Designer.

4.3.2.1 Fire alarm system plans and specifications shall be developed in accordance with this Code by persons who are experienced in the proper design, application, installation, and testing of fire alarm systems.

4.3.2.2 The system designer shall be identified on the system design documents. Acceptable evidence of qualifications or certification shall be provided when requested by the authority having jurisdiction. Qualified personnel shall include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for fire alarm system design of the specific type and brand of system being designed
(2)* Personnel who are certified by a nationally recognized fire alarm certification organization acceptable to the authority having jurisdiction
(3**)** **Personnel who are registered, licensed, or certified by a** state or **local authority**

4.3.3 System Installer. Installation personnel shall be qualified or shall be supervised by persons who are qualified in the installation, inspection, and testing of fire alarm systems. Evidence of qualifications or certification shall be provided when requested by the authority having jurisdiction. Qualified personnel shall include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for fire alarm system installation of the specific type and brand of system being installed
(2)* Personnel who are certified by a nationally recognized fire alarm certification organization acceptable to the authority having jurisdiction
(3**)** **Personnel who are registered, licensed, or certified by a** state or **local authority**

So the end result is that the professional registrant ***does not*** have to draw a complete system for either fire sprinkler or fire alarm systems, although they frequently do.

Their drawings are meant to be a “conceptual design” to set the parameters for the project. Their “conceptual design” can then be bid out to obtain the best price for installation.

Quite often during the design of a building and during construction changes are made to accommodate and address different challenges in the field and material availability.

A real world example was a project that changed from open web trusses to TGI trusses. Structurally they were equivalent. However, this change completely altered the design of both the fire sprinkler and fire alarm systems.

In the case of fire alarm systems, many systems are proprietary and must be installed according to the manufacturer’s instructions. The brand of system is not known by the professional registrant when they design the *“conceptual system”* at the beginning of the project.

This is why we require that the professional registrant perform the functions specified by the BTR and that ***the installing contractors then prepare the detail “shop drawings” for approval*** prior to installation of the system. These “shop drawings” are to be based upon the approved engineer’s conceptual design parameters and the approved architectural plans.

APPLICABLE LAWS

Arizona Revised Statutes § 32-101(B)(11).

Arizona Administrative Code, Title 4, Chapter 30 R4-30-302 (B)(4).

Ref:
(http://www.btr.state.az.us/regulations/substantive_policy.asp#FIRE%20SPRINKLERS%20AND%20FIRE%20ALARM%20SYSTEMS)